



SEQUENCE LISTING

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YASUEDA, Hisashi
GUNJI, Yoshiya

<120> METHOD FOR PRODUCING ALCOHOL BY USING MICROORGANISM

<130>

<150> JP 2001-270903
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<160> 5

<170> PatentIn Ver. 2.0

<210> 1
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<212> DNA
<213> Artificial Sequence

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<223> Description of Artificial Sequence:primer

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<223> Description of Artificial Sequence:primer

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<210> 3
<211> 39
<212> DNA
<213> Artificial Sequence

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<223> Description of Artificial Sequence:primer

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<212> DNA
<213> Artificial Sequence

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<223> Description of Artificial Sequence:primer

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 Met Ala Leu Ser Thr Ala
 1 5
 acc aag gcc gcg acg gac gcg ctg gct gcc aat cgg gca ccc acc acc agc 1543
 Thr Lys Ala Ala Thr Asp Ala Leu Ala Ala Asn Arg Ala Pro Thr Ser
 10 15 20
 gtg aat gca cag gaa gtg cac cgt tgg ctc cag agc ttc aac tgg gat 1591
 Val Asn Ala Gln Glu Val His Arg Trp Leu Gln Ser Phe Asn Trp Asp
 25 30 35
 ttc aag aac aac cgg acc aag tac gcc acc aag tac aag atg gcg aac 1639
 Phe Lys Asn Asn Arg Thr Lys Tyr Ala Thr Lys Tyr Lys Met Ala Asn
 40 45 50
 gag acc aag gaa cag ttc aag ctg atc gcc aag gaa tat gcg cgc atg 1687
 Glu Thr Lys Glu Gln Phe Lys Leu Ile Ala Lys Glu Tyr Ala Arg Met
 55 60 65 70
 gag gca gtc aag gac gaa agg cag ttc ggt agc ctg cag gat gcg ctg 1735
 Glu Ala Val Lys Asp Glu Arg Gln Phe Gly Ser Leu Gln Asp Ala Leu
 75 80 85
 acc cgc ctc aac gcc ggt gtt cgc gtt cat ccg aag tgg aac gag acc 1783
 Thr Arg Leu Asn Ala Gly Val Arg Val His Pro Lys Trp Asn Glu Thr
 90 95 100
 atg aaa gtg gtt tcg aac ttc ctg gaa gtg ggc gaa tac aac gcc atc 1831
 Met Lys Val Val Ser Asn Phe Leu Glu Val Gly Glu Tyr Asn Ala Ile
 105 110 115
 gcc gct acc ggg atg ctg tgg gat tcc gcc cag gcg gcg gaa cag aag 1879
 Ala Ala Thr Gly Met Leu Trp Asp Ser Ala Gln Ala Ala Glu Gln Lys
 120 125 130
 aac ggc tat ctg gcc cag gtg ttg gat gaa atc cgc cac acc cac cag 1927
 Asn Gly Tyr Leu Ala Gln Val Leu Asp Glu Ile Arg His Thr His Gln
 135 140 145 150
 tgt gcc tac gtc aac tac tac ttc gcg aag aac ggc cag gac ccg gcc 1975
 Cys Ala Tyr Val Asn Tyr Tyr Phe Ala Lys Asn Gly Gln Asp Pro Ala
 155 160 165
 ggt cac aac gat gct cgc cgc acc cgt acc atc ggt ccg ctg tgg aag 2023
 Gly His Asn Asp Ala Arg Arg Thr Arg Thr Ile Gly Pro Leu Trp Lys
 170 175 180
 ggc atg aag cgc gtg ttt tcc gac ggc ttc att tcc ggc gac gcc gtg 2071
 Gly Met Lys Arg Val Phe Ser Asp Gly Phe Ile Ser Gly Asp Ala Val
 185 190 195
 gaa tgc tcc ctc aac ctg cag ctg gtg ggt gag gcc tgc ttc acc aat 2119
 Glu Cys Ser Leu Asn Leu Gln Leu Val Gly Glu Ala Cys Phe Thr Asn
 200 205 210
 ccg ctg atc gtc gca gtg acc gaa tgg gct gcc gcc aac ggc gat gaa 2167
 Pro Leu Ile Val Ala Val Thr Glu Trp Ala Ala Ala Asn Gly Asp Glu
 215 220 225 230
 atc acc ccg acg gtg ttc ctg tcg atc gag acc gac gaa ctg cgc cac 2215
 Ile Thr Pro Thr Val Phe Leu Ser Ile Glu Thr Asp Glu Leu Arg His
 235 240 245
 atg gcc aac ggt tac cag acc gtc gtt tcc atc gcc aac gat ccg gct 2263
 Met Ala Asn Gly Tyr Gln Thr Val Val Ser Ile Ala Asn Asp Pro Ala
 250 255 260
 tcc gcc aag tat ctc aac acg gac ctg aac aac gcc ttc tgg acc cag 2311
 Ser Ala Lys Tyr Leu Asn Thr Asp Leu Asn Asn Ala Phe Trp Thr Gln
 265 270 275
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 Gln Lys Tyr Phe Thr Pro Val Leu Gly Met Leu Phe Glu Tyr Gly Ser

280	285	290	
aag ttc aag gtc gag ccg tgg gtc aag acg tgg gac cgc tgg gtg tac Lys Phe Lys Val Glu Pro Trp Val Lys Thr Trp Asp Arg Trp Val Tyr 295 300 305 310			2407
gag gac tgg ggc ggc atc tgg atc ggc cgt ctg ggc aag tac ggg gtg Glu Asp Trp Gly Gly Ile Trp Ile Gly Arg Leu Gly Lys Tyr Gly Val 315 320 325			2455
gag tcg ccg cgc agc ctc aag gac gcc aag cag gac gct tac tgg gct Glu Ser Pro Arg Ser Leu Lys Asp Ala Lys Gln Asp Ala Tyr Trp Ala 330 335 340			2503
cac cac gac ctg tat ctg ctg gct tat gcg ctg tgg cgc acc ggc ttc His His Asp Leu Tyr Leu Ala Tyr Ala Leu Trp Pro Thr Gly Phe 345 350 355			2551
ttc cgt ctg gcg ctg ccg gat cag gaa gaa atg gag tgg ttc gag gcc Phe Arg Leu Ala Leu Pro Asp Gln Glu Glu Met Glu Trp Phe Glu Ala 360 365 370			2599
aac tac ccc ggc tgg tac gac cac tac ggc aag atc tac gag gaa tgg Asn Tyr Pro Gly Trp Tyr Asp His Tyr Gly Lys Ile Tyr Glu Glu Trp 375 380 385 390			2647
cgc gcc cgc ggt tgc gag gat ccg tcc tcg ggc ttc atc ccg ctg atg Arg Ala Arg Gly Cys Glu Asp Pro Ser Ser Gly Phe Ile Pro Leu Met 395 400 405			2695
tgg ttc atc gaa aac aac cat ccc atc tac atc gat cgc gtg tcg caa Trp Phe Ile Glu Asn Asn His Pro Ile Tyr Ile Asp Arg Val Ser Gln 410 415 420			2743
gtg ccg ttc tgc ccg agc ttg gcc aag ggc gcc agc acc ctg cgc gtg Val Pro Phe Cys Pro Ser Leu Ala Lys Gly Ala Ser Thr Leu Arg Val 425 430 435			2791
cac gag tac aac ggc gag atg cac acc ttc agc gac cag tgg ggc gag His Glu Tyr Asn Gly Glu Met His Thr Phe Ser Asp Gln Trp Gly Glu 440 445 450			2839
cgc atg tgg ctg gcc gag ccg gag cgc tac gag tgc cag aac atc ttc Arg Met Trp Leu Ala Glu Pro Glu Arg Tyr Glu Cys Gln Asn Ile Phe 455 460 465 470			2887
gaa cag tac gaa gga cgc gaa ctg tcg gaa gtg atc gcc gaa ctg cac Glu Gln Tyr Glu Gly Arg Glu Leu Ser Glu Val Ile Ala Glu Leu His 475 480 485			2935
ggg ctg cgc agt gat ggc aag acc ctg atc gcc cag ccg cat gtc cgt Gly Leu Arg Ser Asp Gly Lys Thr Leu Ile Ala Gln Pro His Val Arg 490 495 500			2983
ggc gac aag ctg tgg acg ttg gac gat atc aaa cgc ctg aac tgc gtc Gly Asp Lys Leu Trp Thr Leu Asp Asp Ile Lys Arg Leu Asn Cys Val 505 510 515			3031
ttc aag aac ccg gtg aag gca ttc aat tga aacgggtgtc gggctccgtc Phe Lys Asn Pro Val Lys Ala Phe Asn 520 525			3081
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gcg gcc gtc att ttg aag gcg ctt cct gaa gct ccg ctg gac ggc aac Ala Ala Val Ile Leu Lys Ala Leu Pro Glu Ala Pro Leu Asp Gly Asn 20 25 30			3189
aac aag atg ggt tat ttc gtc acc ccc cgc tgg aaa cgc ttg acg gaa Asn Lys Met Gly Tyr Phe Val Thr Pro Arg Trp Lys Arg Leu Thr Glu 35 40 45			3237
tat gaa gcc ctg acc gtt tat gcg cag ccc aac gcc gac tgg atc gcc			3285
			3333

Tyr Glu Ala Leu Thr Val Tyr Ala Gln Pro Asn Ala Asp Trp Ile Ala			
50	55.	60	
ggc ggc ctg gac tgg ggc gac tgg acc cag aaa ttc cac ggc ggc cgc			3381
Gly Gly Leu Asp Trp Gly Asp Trp Thr Gln Lys Phe His Gly Gly Arg			
65	70	75	80
cct tcc tgg ggc aac gag acc acg gag ctg cgc acc gtc gac tgg ttc			3429
Pro Ser Trp Gly Asn Glu Thr Thr Glu Leu Arg Thr Val Asp Trp Phe			
85	90	95	
aag cac cgt gac ccg ctc cgc cgt tgg cat gcg ccg tac gtc aag gac			3477
Lys His Arg Asp Pro Leu Arg Arg Trp His Ala Pro Tyr Val Lys Asp			
100	105	110	
aag gcc gag gaa tgg cgc tac acc gac cgc ttc ctg cag ggt tac tcc			3525
Lys Ala Glu Glu Trp Arg Tyr Thr Asp Arg Phe Leu Gln Gly Tyr Ser			
115	120	125	
gcc gac ggt cag atc cgg gcg atg aac ccg acc tgg cgg gac gag ttc			3573
Ala Asp Gly Gln Ile Arg Ala Met Asn Pro Thr Trp Arg Asp Glu Phe			
130	135	140	
atc aac cgg tat tgg ggc gcc ttc ctg ttc aac gaa tac gga ttg ttc			3621
Ile Asn Arg Tyr Trp Gly Ala Phe Leu Phe Asn Glu Tyr Gly Leu Phe			
145	150	155	160
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Asn Ala His Ser Gln Gly Ala Arg Glu Ala Leu Ser Asp Val Thr Arg			
165	170	175	
gtc agc ctg gct ttc tgg ggc ttc gac aag atc gac atc gcc cag atg			3717
Val Ser Leu Ala Phe Trp Gly Phe Asp Lys Ile Asp Ile Ala Gln Met			
180	185	190	
atc caa ctc gaa cgg ggt ttc ctc gcc aag atc gta ccc ggt ttc gac			3765
Ile Gln Leu Glu Arg Gly Phe Leu Ala Lys Ile Val Pro Gly Phe Asp			
195	200	205	
gag tcc aca gcg gtg ccg aag gcc gaa tgg acg aac ggg gag gtc tac			3813
Glu Ser Thr Ala Val Pro Lys Ala Glu Trp Thr Asn Gly Glu Val Tyr			
210	215	220	
aag agc gcc cgt ctg gcc gtg gaa ggg ctg tgg cag gag gtg ttc gac			3861
Lys Ser Ala Arg Leu Ala Val Glu Gly Leu Trp Gln Glu Val Phe Asp			
225	230	235	240
tgg aac gag agc gct ttc tcg gtg cac gcc gtc tat gac gcg ctg ttc			3909
Trp Asn Glu Ser Ala Phe Ser Val His Ala Val Tyr Asp Ala Leu Phe			
245	250	255	
ggt cag ttc gtc cgc cgc gag ttc ttt cag cgg ctg gct ccc cgc ttc			3957
Gly Gln Phe Val Arg Arg Glu Phe Phe Gln Arg Leu Ala Pro Arg Phe			
260	265	270	
ggc gac aat ctg acg cca ttc atc aac cag gcc cag aca tac ttc			4005
Gly Asp Asn Leu Thr Pro Phe Phe Ile Asn Gln Ala Gln Thr Tyr Phe			
275	280	285	
cag atc gcc aag cag ggc gta cag gat ctg tat tac aac tgt ctg ggt			4053
Gln Ile Ala Lys Gln Gly Val Gln Asp Leu Tyr Tyr Asn Cys Leu Gly			
290	295	300	
gac gat ccg gag ttc agc gat tac aac cgt acc gtg atg cgc aac tgg			4101
Asp Asp Pro Glu Phe Ser Asp Tyr Asn Arg Thr Val Met Arg Asn Trp			
305	310	315	320
acc ggc aag tgg ctg gag ccc acg atc gcc gct ctg cgc gac ttc atg			4149
Thr Gly Lys Trp Leu Glu Pro Thr Ile Ala Ala Leu Arg Asp Phe Met			
325	330	335	
ggg ctg ttt gcg aag ctg ccc ggc acc act gac aag gaa gaa atc			4197
Gly Leu Phe Ala Lys Leu Pro Ala Gly Thr Thr Asp Lys Glu Glu Ile			
340	345	350	
acc gcg tcc ctg tac cgg gtg gtc gac gac tgg atc gag gac tac gcc			4245

Thr Ala Sér Leu Tyr Arg Val Val Asp Asp Trp Ile Glu Asp Tyr Ala
 355 .360 365 4293
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 Ser Ala Ile Asp Phe Lys Ala Asp Arg Asp Gln Ile Val Lys Ala Val
 370 375 380 4345
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 Leu Ala Gly Leu Lys Met Ser Val Asn Ser Asn
 385 1 5
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 10 15 20 4393
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 Gln Phe Phe Ala Asp Glu Asn Gln Val Val His Glu Ser Asp Thr Val
 25 30 35 4441
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 Val Leu Val Leu Lys Lys Ser Asp Glu Ile Asn Thr Phe Ile Glu Glu
 40 45 50 4489
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 Glu Asp Arg Ala Gly Tyr Trp Trp Ile Lys Ala Asn Gly Lys Ile Glu
 75 80 85 4585
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 Val Asp Cys Asp Glu Ile Ser Glu Leu Leu Gly Arg Gln Phe Asn Val
 90 95 100 4633
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 Tyr Asp Phe Leu Val Asp Val Ser Ser Thr Ile Gly Arg Ala Tyr Thr
 105 110 115 4681
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 Leu Gly Asn Lys Phe Thr Ile Thr Ser Glu Leu Met Gly Leu Asp Arg
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 Lys Leu Glu Asp Tyr His Ala Met Ala Lys Leu Gly
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 Ile His Ser Asn Asp Thr Arg Asp Ala Trp Val Asn Lys Ile Ala Gln
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 Leu Trp Ile Glu Ala Lys Leu Glu Lys Val Ala Val Leu Lys Ala
 55 60 65 4970
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 Arg Ala Phe Asn Glu Val Asp Phe Arg His Lys Thr Ala Phe Gly Glu
 70 75 80 85 5018
 gat gcc aag tcc gtt ctg gac ggc acc gtc gcg aag atg aac gcg gcc
 Asp Ala Lys Ser Val Leu Asp Gly Thr Val Ala Lys Met Asn Ala Ala
 90 95 100 5066
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 Lys Asp Lys Trp Glu Ala Glu Lys Ile His Ile Gly Phe Arg Gln Ala
 105 110 115 5114
 tac aag ccg ccg atc atg ccg gtg aac tat ttc ctg gac ggc gag cgt 5162

Tyr Lys Pro Pro Ile Met Pro Val Asn Tyr Phe Leu Asp Gly Glu Arg				
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Gln Leu Gly Thr Arg Leu Met Glu Leu Arg Asn Leu Asn Tyr Tyr Asp				
135	140	145		
acg ccg ctg gaa gaa ctg cgc aaa cag cgc ggt gtg cgg gtg gtg cat				5258
Thr Pro Leu Glu Glu Leu Arg Lys Gln Arg Gly Val Arg Val Val His				
150	155	160	165	
ctg cag tcg ccc cac tga agggaggaag tctcgccctg gacgcgacgg				5306
Leu Gln Ser Pro His				
170				
catcgccgtg aagtccaggg ggcagggatg ccgttccggg ccggcaggct ggcccgaaat				5366
ctctggttt cagggggcgt gccggcac ggctcccccc ctccatctt cgtaaggaaa				5426
tcacc atg gtc gaa tcg gca ttt cag cca ttt tcg ggc gac gca gac gaa				5476
Met Val Glu Ser Ala Phe Gln Pro Phe Ser Gly Asp Ala Asp Glu				
1	5	10	15	
tgg ttc gag gaa cca cgg ccc cag gcc ggt ttc ttc cct tcc gcg gac				5524
Trp Phe Glu Pro Arg Pro Gln Ala Gly Phe Phe Pro Ser Ala Asp				
20	25	30		
tgg cat ctg ctc aaa cgg gac gag acc tac gca gcc tat gcc aag gat				5572
Trp His Leu Leu Lys Arg Asp Glu Thr Tyr Ala Ala Tyr Ala Lys Asp				
35	40	45		
ctc gat ttc atg tgg cgg tgg gtc atc gtc cgg gaa gaa agg atc gtc				5620
Leu Asp Phe Met Trp Arg Trp Val Ile Val Arg Glu Glu Arg Ile Val				
50	55	60		
cag gag ggt tgc tcg atc agc ctg gag tcg tcg atc cgc gcc gtg acg				5668
Gln Glu Gly Cys Ser Ile Ser Leu Glu Ser Ser Ile Arg Ala Val Thr				
65	70	75		
cac gta ctg aat tat ttt ggt atg acc gaa caa cgc gcc ccg gca gag				5716
His Val Leu Asn Tyr Phe Gly Met Thr Glu Gln Arg Ala Pro Ala Glu				
80	85	90	95	
gac cgg acc ggc gga gtt caa cat tga acaggtaagt tt atg cag cga gtt				5767
Asp Arg Thr Gly Gly Val Gln His				
100		1		
cac act atc acg gcg gtg acg gag gat ggc gaa tcg ctc cgc ttc gaa				5815
His Thr Ile Thr Ala Val Thr Glu Asp Gly Glu Ser Leu Arg Phe Glu				
5	10	15	20	
tgc cgt tcg gac gag gac gtc atc acc gcc gcc ctg cgc cag aac atc				5863
Cys Arg Ser Asp Glu Asp Val Ile Thr Ala Ala Leu Arg Gln Asn Ile				
25	30	35		
ttt ctg atg tcg tcc tgc cgg gag ggc ggc tgt gcg acc tgc aag gcc				5911
Phe Leu Met Ser Ser Cys Arg Glu Gly Gly Cys Ala Thr Cys Lys Ala				
40	45	50		
ttg tgc agc gaa ggg gac tac gac ctc aag ggc tgc agc gtt cag gcg				5959
Leu Cys Ser Glu Gly Asp Tyr Asp Leu Lys Gly Cys Ser Val Gln Ala				
55	60	65		
ctg ccg ccg gaa gag gag gag gaa ggg ttg gtg ttg ttg tgc cgg acc				6007
Leu Pro Pro Glu Glu Glu Glu Leu Val Leu Leu Cys Arg Thr				
70	75	80		
tac ccg aag acc gac ctg gaa atc gaa ctg ccc tat acc cat tgc cgc				6055
Tyr Pro Lys Thr Asp Leu Glu Ile Glu Leu Pro Tyr Thr His Cys Arg				
85	90	95	100	
atc agt ttt ggt gag gtc ggc agt ttc gag gcg gag gtc gtc ggc ctc				6103
Ile Ser Phe Gly Glu Val Gly Ser Phe Glu Ala Glu Val Val Gly Leu				
105	110	115		
aac tgg gtt tcg agc aac acc gtc cag ttt ctt ttg cag aag cgg ccc				6151
Asn Trp Val Ser Ser Asn Thr Val Gln Phe Leu Leu Gln Lys Arg Pro				

120	125	130	
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Asp Glu Cys Gly Asn Arg Gly Val Lys Phe Glu Pro Gly Gln Phe Met			
135	140	145	
gac ctg acc atc ccc ggc acc gat gtc tcc cgc tcc tac tcg ccg gcg			6247
Asp Leu Thr Ile Pro Gly Thr Asp Val Ser Arg Ser Tyr Ser Pro Ala			
150	155	160	
aac ctt cct aat ccc gaa ggc cgc ctg gag ttc ctg atc cgc gtg tta			6295
Asn Leu Pro Asn Pro Glu Gly Arg Leu Glu Phe Leu Ile Arg Val Leu			
165	170	175	180
ccg gag gga cggtt tcg gac tac ctg cgc aat gac gcg cgt gtc gga			6343
Pro Glu Gly Arg Phe Ser Asp Tyr Leu Arg Asn Asp Ala Arg Val Gly			
185	190	195	
cag gtc ctc tcg gtc aaa ggg cca ctg ggc gtg ttc ggt ctc aag gag			6391
Gln Val Leu Ser Val Lys Gly Pro Leu Gly Val Phe Gly Leu Lys Glu			
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Arg Gly Met Ala Pro Arg Tyr Phe Val Ala Gly Gly Thr Gly Leu Ala			
215	220	225	
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Pro Val Val Ser Met Val Arg Gln Met Gln Glu Trp Thr Ala Pro Asn			
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Glu Thr Arg Ile Tyr Phe Gly Val Asn Thr Glu Pro Glu Leu Phe Tyr			
245	250	255	260
atc gac gag ctc aaa tcc ctg gaa cga tcg atg cgc aat ctc acc gtg			6583
Ile Asp Glu Leu Lys Ser Leu Glu Arg Ser Met Arg Asn Leu Thr Val			
265	270	275	
aag gcc tgt gtc tgg cac ccg agc ggg gac tgg gaa ggc gag cag ggc			6631
Lys Ala Cys Val Trp His Pro Ser Gly Asp Trp Glu Gly Glu Gln Gly			
280	285	290	
tcg ccc atc gat gcg ttg cgg gaa gac ctg gag tcc tcc gac gcc aac			6679
Ser Pro Ile Asp Ala Leu Arg Glu Asp Leu Glu Ser Ser Asp Ala Asn			
295	300	305	
ccg gac att tat ttg tgc ggt ccg ccg ggc atg atc gat gcc gcc tgc			6727
Pro Asp Ile Tyr Leu Cys Gly Pro Pro Gly Met Ile Asp Ala Ala Cys			
310	315	320	
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Glu Leu Val Arg Ser Arg Gly Ile Pro Gly Glu Gln Val Phe Phe Glu			
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Lys Phe Leu Pro Ser Gly Ala Ala			
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ttttgt			7188

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